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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
NGUYEN, LAM S

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/936,943	YAKURA ET AL.
	Examiner	Art Unit
	LAM S NGUYEN	2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *16,17,25,26,34 and 35* is/are allowed.

6)☒ Claim(s) *1-15,18-24,27-33 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-6 are rejected under 35 U.S.C. 102(b) as being obvious by Ayata et al. (US 4463359).

Ayata et al. disclose a method for driving a recording head having a plurality of heating elements as driving elements for ejecting ink droplets from a plurality of nozzles, the plurality of heating elements being arranged in a direction substantially perpendicular to the direction of carrying a carried recording medium (FIG. 20), the method comprising:

a time-division driving step of dividing the plurality of heating elements into a plurality of blocks (FIG. 25, block 1 includes printing elements 1H1-1H32), each block consisting of a predetermined number of spatially arranged heating elements (FIG. 25, elements 1H1-1H32 of block 1) of the plurality of heating elements corresponding to the plurality of nozzles, respective ones of the heating elements and the corresponding nozzles in each block positioned similarly to form respective positional sets (FIG. 23B, 25) and sequentially driving each set of heating elements simultaneously driven over the respective blocks, in a tine-divisional manner in a driving order so that non-adjacent heating elements in any block are driven in the next set to avoid cross-talk due to driving adjacent heating elements (FIG. 23B, 24); and

a recording step of ejecting ink droplets from the nozzles corresponding to the driven heating elements and impacting the ink droplets on the recording medium thus recording dots made of the ink droplets (FIG. 1).

Referring to claims 2, 5: wherein at the time-division driving step, the heating elements are driven on the basis of a division drive signal generated for said each set (FIG. 25, all elements 1H1-56H1 are driven by pulse P1) and an element drive signal, which is a signal for driving the heating elements and is made up of necessary data for forming one dot (FIG. 9a and FIG. 10e).

Referring to claims 3, 6: wherein at the time division driving step, the division drive signals corresponding to the number of time divisions are generated by multidimensional input signals (FIG. 43: the division drive signals outputted from elements NI1-NIV32 which have two inputs: LA1-LA4 and L10).

Referring to claim 4: consecutive ones of the heating elements being disposed sufficiently adjacent to one another to cause cross-talk therebetween (column 15, line 17-45 and column 23, line 26-39).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayata et al. (US 4463359) in view of Hackleman et al. (US 5600354).

Ayata et al. disclose the claimed invention as discussed above and also disclose wherein the plurality of blocks arranged in first and second rows extending in a sub scanning direction and spaced apart from one another in a main scanning direction to form a zigzag array with end ones of the nozzles in the blocks in the first row overlapping end ones of the nozzles in the blocks in the second row (FIG. 18). However, Ayata et al. do not disclose wherein the end of ones of the nozzles in the first row and the end ones of the nozzles in the second row share respective common center lines extending in the main scanning direction.

Hackleman et al. disclose a printhead including plurality of sub-printheads arranged in first and second rows extending in a sub scanning direction and spaced apart from one another in a main scanning direction to form a zigzag array with end ones of the nozzles in the sub-printheads in the first row overlapping end ones of the nozzles in the blocks in the second row wherein the end of ones of the nozzles in the first row and the end ones of the nozzles in the second row share respective common center lines extending in the main scanning direction (FIG. 2, column 4, line 14 to column 5, line 31).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printhead disclosed by Ayata et al. such that the plurality of blocks arranged wherein the end of ones of the nozzles in the first row and the end ones of the nozzles in the second row share respective common center lines extending in the main scanning direction as disclosed by Hackleman et al. The motivation of doing so is to reduce the data

bandwidth requirement of a high resolution ink jet printer as taught by Hackleman et al. (column 2, line 56-59).

3. Claims 10-15, 18-24, 27-33, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayata et al. (US 4463359) in view of Sekiya et al. (US 5877786).

Ayata et al. disclose the claimed invention as discussed above and the comprising of a storage means for storing record data made up of necessary data for forming one dot (FIG. 38) **(Referring to claims 21 and 30)**. However, Ayata et al. do not disclose that the comprising of a drive signal generating step of generating an element drive signal made of necessary data for forming one dot so as to modulate the diameter of a dot by the number of ink droplets, using one or a plurality of ink droplets for forming one dot, wherein record data made up of necessary data for forming one dot is compared with the number of pulses generated for determining the number of said ink droplets to be ejected from the nozzles, and the result of comparison is outputted as the element drive signal **(Referring to claim 12)**, wherein the order of the pulses to be objects of comparison with the record data is determined so that a dot to be formed on the recording medium is equivalent to a dot formed by distributing the ink droplets in the direction of carrying the recording medium from a lattice point as the center, which is the position on the recording medium in forming one dot with one said ink droplet **(Referring to claims 13 and 22)**, also wherein at the drive signal generating step, in the case of forming one dot with the ink droplets of even ordinal numbers, the order of the pulses to be objects of comparison with the record data is determined so that the resultant dot is equivalent to a dot formed by distributing the ink droplets of odd ordinal numbers and the ink droplets of even ordinal numbers in the direction of carrying the recording medium symmetrically about the lattice point as the center,

and in the case of forming one dot with the ink droplets of odd ordinal numbers, the order of the pulses to be objects of comparison with the record data is determined so that the resultant dot is equivalent to a dot formed by impacting the first ink droplet on the lattice point and then distributing the ink droplets of odd ordinal numbers and the ink droplets of even ordinal numbers in the direction of carrying the recording medium symmetrically about the lattice point as the center **(Referring to claims 14 and 23)**, wherein at the recording step, recording is carried out while the position on the recording medium where the ink droplet should be impacted is changed in accordance with the number of pulses generated at the drive signal generating step **(Referring to claims 15 and 24)**, a correcting unevenness step of correcting unevenness of print density by controlling pulse number moderation by adding or subtraction pulses for ejecting ink droplets in quantities fixed by the respective nozzles to compensate at least in part for desired target quantities of ink droplets to correct unevenness of print density **(Referring to claims 10 and 28)**, and distribution means for distributing the ejected ink drops on the carried recording means using phase-corresponding data with respect to pulse numbers so that at least a first resultant dot having a first size and at least a second result in dot having a second size different from the first size formed thereon are oriented generally centrally about respective imaginary lattice point defining imaginary horizontal and vertical grid lines on the carried recording medium **(Referring to claim 19)**.

Sekiya et al. disclose the comprising of a drive signal generating step of generating an element drive signal made of necessary data for forming one dot so as to modulate the diameter of a dot by the number of ink droplets, using one or a plurality of ink droplets for forming one dot (FIG. 3), wherein record data made up of necessary data for forming one dot is compared

with the number of pulses generated for determining the number of said ink droplets to be ejected from the nozzles, and the result of comparison is outputted as the element drive signal (FIG. 14A-B: a corresponding comparator inputted the dot data determines the number of ink droplets represented by number of pulses) **(Referring to claims 12, 30),** and wherein the order of the pulses to be objects of comparison with the record data is determined so that a dot to be formed on the recording medium is equivalent to a dot formed by distributing the ink droplets in the direction of carrying the recording medium from a lattice point as the center, which is the position on the recording medium in forming one dot with one said ink droplet (FIG. 14A-B: the order of pulses is demonstrated in FIG. 14B. In case of a full-line head in which the head is stationary while the recording medium is moving, the positions of ink droplets landing on the recording medium are distributed in the direction of carrying the recording medium as demonstrated in FIG. 14A) **(Referring to claims 13, 31)**, also wherein at the drive signal generating step, in the case of forming one dot with the ink droplets of even ordinal numbers, the order of the pulses to be objects of comparison with the record data is determined so that the resultant dot is equivalent to a dot formed by distributing the ink droplets of odd ordinal numbers and the ink droplets of even ordinal numbers in the direction of carrying the recording medium symmetrically about the lattice point as the center, and in the case of forming one dot with the ink droplets of odd ordinal numbers, the order of the pulses to be objects of comparison with the record data is determined so that the resultant dot is equivalent to a dot formed by impacting the first ink droplet on the lattice point and then distributing the ink droplets of odd ordinal numbers and the ink droplets of even ordinal numbers in the direction of carrying the recording medium symmetrically about the lattice point as the center (FIG. 14A-B and column 17, line 3-40)

(Referring to claims 14, 32), wherein at the recording step, recording is carried out while the position on the recording medium where the ink droplet should be impacted is changed in accordance with the number of pulses generated at the drive signal generating step (FIG. 14A-B) **(Referring to claims 15 and 33)**, a correcting unevenness step of correcting unevenness of print density by controlling pulse number moderation by adding or subtraction pulses for ejecting ink droplets in quantities fixed by the respective nozzles to compensate at least in part for desired target quantities of ink droplets to correct unevenness of print density (FIG. 13-14), and distribution means for distributing the ejected ink drops on the carried recording means using phase-corresponding data with respect to pulse numbers so that at least a first resultant dot having a first size and at least a second result in dot having a second size different from the first size (FIG. 3, 7A) formed thereon are oriented generally centrally about respective imaginary lattice point defining imaginary horizontal and vertical grid lines on the carried recording medium (FIG. 14: a corresponding distribution means for distributing the ejected ink drops) **(Referring to claim 19)**.

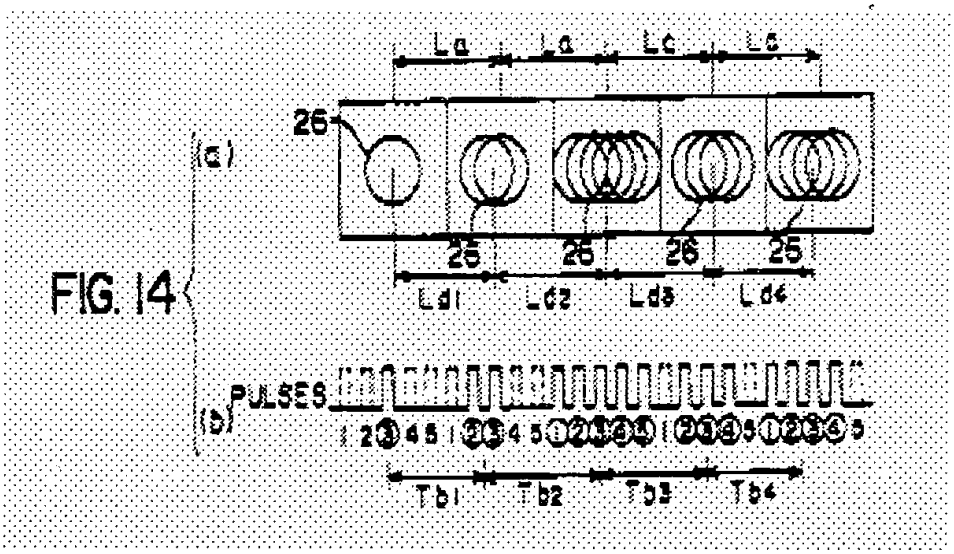

FIG. 14

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to include a drive signal generating step for modulating the diameter of a dot by the number of ink droplets by generating a corresponding number of pulses and a distributing step for distributing the ejected ink drops so that reluctant dots formed oriented generally centrally about respective imaginary lattice point defining imaginary horizontal and vertical grid as disclosed by Sekiya et al. into the method for driving a printing apparatus disclosed by Ayata et al. The motivation of doing so is to provide an ink jet recording head in which a dot size is controlled in accordance with image density information so that gray scale recording of images can be performed as taught by Sekiya et al. (column 2, line 35-40).

Allowable Subject Matter

3. Claims 16, 17, 25, 26, 34, 35 are allowed

Referring to claims 16, 25, and 34: The most pertinent arts Ayata et al. (US 4463359) and Sekiya et al. (US 5877786) fail to disclose wherein at the drive signal generating step, the record data is temporally divided into two, and the order of the pulses to be objects of comparison with the former half record data of the record data divided into two is determined so that a dot to be formed on the recording medium is equivalent to a dot formed by distributing the ink droplets in the direction of carrying the recording medium from a lattice point as the center. Therefore, the claimed invention is not disclosed by the cited prior arts.

Referring to claims 17, 26, 35: Allowed since their dependence on the allowed claims 16, 25, and 34.

Response to Arguments

Applicant's arguments with respect to claim 7 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed on 06/20/2003 referring to claims 1, 4, 10, 19, and 28 have been fully considered but they are not persuasive. As discussed above, the amendment does not overcome the applied arts.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (703)308-4896. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

August 30, 2003

Stephen D. Meier
Primary Examiner